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ARTICLE XII.

A CONTRIBUTION TO THE KNOWLEDGE OF THE FLORA OF THE COAL PERIOD IN THE
UNITED STATES.

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Read September 21, 1866.

THE specimens upon which this paper is founded are all of them in the Cabinet of the Academy of Natural Sciences in this city. Much of the memoir is a review of several papers published some years since in the Proceedings of the Academy, and is the result of a careful reconsideration and study of the subject with the light of further specimens and new publications.

SIGILLARIA, *Brongt.*

S. SOLENE, *Wood.* Stem costate; ribs strongly convex, approximate, distantly irregularly striate, with a well-marked central groove or broad channel; leaf-scars situated in the groove, small, subovate; vascular scars situated near the smaller end, 3, the central a dot, the lateral linear, arcuate.

The central portion of the channel between the scars is finely and closely striated like chasing; at the position of the scars the groove is slightly widened; the lateral margins of the leaf-scars are not regularly curved, but have a faintly marked angle near the base. The distance between the scars is from five to six times their length. This species is allied to *S. rugosa* and *S. elongata*; it differs from both in the smallness of its leaf-scars and their remoteness one from the other. It also wants the rugosities of *rugosa*. When decorticated the ribs are very strongly striate.

S. solanus, *Wood.* Proc. A. N. S., vol. xii, 1860, p. 237.

The type specimen in the Museum of the Academy is very large.

S. CYMATOIDES, *Wood.* Stem costate; ribs very narrow; furrows distinct, rather broad, marked, as are also the ribs, in the decorticated state, with numerous close striæ; scars large,

somewhat elongate, almost as wide as the ribs, their lower half tumified, so as to give the appearance of grooves running across at an angle of about 60° to the stem; the space between the scars about half their length, closely chased with numerous transverse, very fine striæ; vascular scars, 3, the central a dot, the lateral linear.

When decorticated the vascular scars are represented by a large dot-like impression.

S. cymatoides, Wood. Proc. A. N. S., vol. xii, 1860, p. 520.

S. BRARDII, Brongt.

Syn. S. Menardii, Brongt. There can be no doubt that these two forms are merely different parts of the same plant. I have frequently observed specimens demonstrating this by having on different portions of their surface cicatrices presenting all the characters of the two forms; Prof. Lesquereux informs me he has also seen such.

Sub-genus ASOLANUS. Wood.

S. CAMPTOTÆNIA, Wood. Surface very closely and distinctly striate; striæ diverging from the leaf-scars, so arranged as to form two sets of columns, the individual striæ in each of which are parallel to the others of the same column, and at right angles to those of the neighboring columns. The striæ of one set appear much more pronounced than those of the other, owing to their opposite directions causing the light to fall on them differently. The leaf-scars are oval, sunken, transverse, with a more or less marked angle at their top. The vascular scar is a central dot, with apparently two lateral linear dots, which latter are obsolete on my specimens.

Asolanus camptotænia, Wood. Proc. A. N. S., vol. xii, 1860, p. 238.

S. ORNITHICNOIDES, Wood. Proc. A. N. S., vol. xii, p. 238, appears to be a good species. The figure (pl. 4, Fig. 6, Proc. A. N. S.), is characteristic.

SYRINGODENDRON, Sternb.

S. BISTRIATUM, Wood. Stem without ribs; bark thin; surface striate with coarse flexuous striæ and numerous similar finer ones; scars small, linear oval, disposed in pairs about eight lines apart.

The difference between the striæ is much more marked in the decorticated surface, as the large ones are on it much more pronounced than on the bark. This plant evidently bears the same relation to the ordinary *Syringodendra* that *Sigillariæ* of the sub-genus *Asolanus*

do to the true *Sigillariæ*. There are no ribs, and the scars have the peculiar form and the absence of vascular scars which belong to the genus *Syringodendron*.

Syn. S. bistratum, Wood. Proc. A. N. S., vol. xii, 1860, p. 521.

Cabinet of the Academy. Locality unknown.

S. MAGNIFICUM, Wood. Proc. A. N. S., vol. xii, 1860, is probably a form of *Sigillaria catenulata*. Lindley and Hutton.

SOLENOULA PSILOPHLÆUS, Wood. Proc. A. N. S., vol. xii, p. 238. Prof. Lesquereux tells me that he considers this fossil as *probably* a decorticated specimen of *Syringodendron cyclostigma*, Brongt. I do not see how the two can be joined except by finding the specimens which present in different portions, the very different characters of each. The figure given (pl. 4, Fig. 3, vol. xii, Proc. A. N. S.), is characteristic.

GEN. *LEPIDODENDRON*, Sternb.

L. OWENI, Wood. Proc. A. N. S., vol. xii, 1860, p. 239. This species is closely related to *L. vestitum*, Lesq., but is probably distinct. The figure given of it (pl. 5, Fig. 1, Proc. A. N. S., vol. xii), is a good one, representing every character on the stone. I think I was mistaken in referring *L. aculeatum*, Sternb., of Owen's Geological Survey of Wisconsin, to this species.

L. URÆUM, Wood. Scars elliptical, somewhat rhomboidal, elongate and curved below and above, marked with transverse flexuous wrinkles; margin slightly raised; vascular scar subrhomboidal or subtriangular (in the one case having the basal angle pronounced, in the other the base merely convex with the remaining angle mostly obtuse), situated a little above the centre of the leaf-scar, impressed with three dots arranged in a curve near its base, the inner of which is linear and transverse; median line not very distinct but running the whole length of the scar,—above the vascular scar, smooth and furnished with a triangular expansion rivalling the vascular scar in size; below the vascular scar, crossed by many very heavy, transverse, flexuous wrinkles; appendages distinct, irregularly curved and of considerable length; tubercles oval, elongate, situated immediately below the vascular scar and close to the median line.

L. uræum, Wood. Proc. A. N. S., vol. xii, 1860, p. 520.

The total length of the leaf-scar, in our type, is $2\frac{3}{8}$ inches; from the lower end to the

top of the vascular scar, measures one and a half inches ; from the top of the vascular scar to the upper end, fourteen-sixteenths of an inch. Through the kindness of Prof. Lesquereux, I have had access to the second volume of Sternberg's *Flora der Vorwelt*, and find that this plant is much more closely related to *L. aculeatum* than *L. caudatum*, Ung., to which I formerly supposed it related, having only Unger's short description to guide me. The principal difference between *L. aculeatum* and it, is to be found in the position of the vascular scar. From the bottom of the leaf-scar to the top of the vascular scar, is in *L. aculeatum* one inch and a half, and from the top of the vascular to the top of the leaf-scar eight-sixteenths of an inch, so that the relation of the two is as three to one, whilst in *L. uræum* it is as twelve to seven. Broad Top Coal Region.

L. DREPANASPIS, Wood. Leaf-scars large, rhomboidal with rounded angles and somewhat curved margins ; margins narrow, very slightly elevated ; vascular scars triangular or sub-rhomboidal, their transverse diameter much the greater, elevated above the general surface, furnished with three dots and situated near the apex of the leaf-scar ; below them is a crescentic, shining slope, on which are placed the roundish tubercles ; appendages parallel to the margin ; median line nearly obsolete, but crossed by numerous short, transverse rugæ.

L. drepanaspis, Wood. Proc. A. N. S., vol. xii, 1860, p. 240.

LEPIDODENDRON ICTHYOLEPIS, Wood. Cortex thin, leaf-scars subtriangular, kite-shaped ; vascular scar strongly elevated, rhomboidal, oval, with the ends acuminate, without internal markings, situated in the apex of the leaf-scar ; appendages well marked, elevated ; median line elevated, pronounced, smooth ; tubercles wanting.

The elevation of the upper portion of the leaf-scar gives an appearance of imbrication, which suggested the name.

Lepidophiloyos ichthyolepis, Wood. Proc. A. N. S., vol. xii, 1860, p. 240.

L. DUBIUM, Wood. Cicatrices lanceolate, acuminate at the base and apex, strongly convex, cristate along the central line ; margin very narrow, flexuous ; vascular scar linear lanceolate, slightly enlarged in the middle, elevated.

L. dubium, Wood. Proc. Acad. Nat. Sciences, New Series, vol. xii (1860), p. 238.

This species is allied to *L. rimosum* and *L. undulatum* of Sternberg. It differs from

both in its linear lanceolate vascular scar, which is reduced to a mere median line; the cicatrices are more elongated, narrower than those of *L. undulatum*, but very similar to those of *L. rimosum*. When the bark is adherent the cicatrices appear only as distant ridges, which are in reality scarcely more than the vascular scars—the remainder of the cicatrix being hidden.

I have seen but a single specimen, which is in the Museum of the Academy of Natural Sciences. Whence it was obtained I am unable to state.

L. GIGANTEUM, Lesq.

L. ingens, Wood. Proc. A. N. S., New Series, vol. xii (1860), p. 239, pl. 6, Fig. 4.

L. ACULEATUM, Sternb.

L. mekiston, Wood. Proc. A. N. S., vol. xii, 1860, p. 239, pl. 5, Fig. 3.

L. OBOVATUM, Sternb.

L. Bordae, Wood. Proc. A. N. S., New Series, vol. xii (1860), p. 239, pl. 6, Fig. 3.

L. RUGOSUM, Sternb.

L. Lesquereuxii, Wood. Proc. A. N. S., vol. xii, 1860, p.

SIGILLARIA PERPLEXA, Wood. Proc. A. N. S., vol. xii, 1860, p. 237. This very odd specimen, which from its apparently having ribs, I referred to the genus *Sigillaria*, is evidently closely connected with the genus *Lepidodendron*, for on removing the bark, I find in one or two of the rectangular spaces the peculiar vascular markings of that genus. Prof. Lesquereux thinks it to be part of a young shoot of his *L. vestitum*. Is it possible that the apparent ribs are the result of accident? I give a figure, so that if any one should find a similar fossil he may know where to refer it to.

L. VESTITUM, Lesq.

L. rectangulum, Wood. Proc. A. N. S., vol. xii, 1860, p. 519.

L. SALEBROSUM, Wood. Leaf-scar rhomboidal; margin elevated, irregularly plicate, often quite flexuous; vascular scars triangular, placed in and filling up the apex of the leaf-scar; appendages apparent; internal dots and tubercles wanting; median line absent, but replaced by a strongly pronounced sub-central pit.

This species is allied to *L. vestitum*, Lesq., but is distinct by the remarkable dot

or pit which is in all the leaf-scars much more strongly pronounced than the vascular scar.

L. salebrosum, Wood. Proc. A. N. S., vol. xii, 1860, p. 520.

L. chilallæum, Wood. Leaf-scars oval, rhomboidal, acuminate at both ends, often elongated into a narrow communicating channel; margin distinct, broad, slightly elevated, alternately contracted and expanded for half the length of the scar; vascular scar deeply sunken, sub-rhomboidal, the transverse diameter much exceeding the height, often four times as great, without dots or internal markings; triangular marking above vascular scar distinct; appendages faintly marked; tubercles absent; median line well marked above the vascular scar, below almost obsolete but crossed by numerous very strongly pronounced rugosities.

L. chilallæum, Wood. Proc. A. N. S., vol. xii, 1860, p. 520.

L. dicrocheilum, Wood. Cicatrices rhomboidal elliptical, with the apex and base somewhat prolonged and acuminate, and the base flexuous; margin raised, broad, regularly flexuous; vascular scars sub-rhomboidal, with apex and base generally rounded and lateral angles acute, situated a little above the centre, but markedly to one side of the leaf-scar, internally marked with three dots, surmounted with a somewhat semilunar impression; the median line distinct, smooth; tubercles and appendages wanting.

L. dicrocheilum, Wood. Proc. A. N. S., vol. xii, 1860, p. 238.

The margins of our specimens so bifurcate that one side receives an offset from the margin of the neighboring scar; so that the margin for half the scar is alternately broad and narrow; thus the margin on the right hand side below is nearly twice the breadth of the right hand upper margin. The total length of the leaf-scar is seven lines, the distance from bottom of leaf to top of vascular scar five lines, from thence to top of leaf-scar two lines.

This species is very closely allied to *Sagenaria dichotoma*, Sternb., and if all the figures given in the *Steinkohlen Formation in Sachsen*, of Geinitz, t. iii, are really one species, I do not see how this can be retained as separate, although the shape of the vascular scar differs somewhat.

Hab. Broad Top. Roof of Cook's (upper) seam.

L. venustum, Wood. Cicatrices rhomboidal, with the bases and apices obtuse, rounded,

their whole surface covered with very minute granules, so that under the glass it presents the appearance of shagreen; vascular scar rhomboidal, with its lateral angles acute, its basal and apical angles acute or rounded, situated just above the middle of the leaf-scar, marked with three internal dots, the lateral of which are generally obsolete; tubercles small, somewhat obovate, the left one mostly obsolete, and when present, placed lower than the right; median line distinct below the vascular scar and crossed by three or four transverse wrinkles, above the vascular scar somewhat obsolete, but furnished with a triangular expansion which gives origin to a long flexuous line from each lateral angle; appendages distinct; margin very narrow and flexuous.

L. venustum, Wood. Proc. A. N. S., vol. xii, p. 240, pl. 5, Fig. 2.

This plant is very near to *L. obtusum*, Lesq., and may prove to be a young branch of it. I have not seen any specimens of that species, but presume that they lack the granulated surface, as it is not mentioned. There are also differences in the shape of the main scar, breadth of margin, appendages, and the upper triangular marking.

GEN. ASTEROPHYLLITES.

A. STACHYOIDES, Wood. Under the name of *Lepidostrobus stachyoides*, I described, Proc. Acad. N. S., vol. xii, 1860, p. 240, a fossil fruit, which is related to *Asterophyllites crassicaulis*, Lesq. As Prof. Lesquereux has shown, these fossils are, probably, nothing more than the fertile fronds of *Asterophyllites*. The nutlets are ovate or obtuse rhombic, the proximal more rhombic, the distal narrower, more ovate. The rachis is very much attenuated, linear. The leaves are long and linear, apparently but one below each nutlet.

GEN. SPHENOPHYLLUM.

S. LATIFOLIUM, N. Sp. Stem moderately thick, somewhat inflated at the joints, strongly sulcate. Leaves very large, apparently in whorls of four, thin, broadly triangular or wedge-shaped, their distal margin irregularly toothed; nervules very strongly pronounced, numerous, dichotomously forking.

Bowen's Collection, Cabinet of the Academy.

GEN. ANNULARIA.

A. MINUTA, Brongt. Prodrôme, p. 155. As there appears to be a good deal of obscurity hanging over this species, M. Brongniart, as far as I can learn, never having

published either description or figure, I give a figure of an *Annularia** from the coal-fields of Western Virginia, to which the name may be applied. The Academy is indebted to Dr. Dixon for it.

GEN. SPHENOPTERIS.

S. PTEROTA, *N. Sp.* Frond bipinnate?; pinnæ nearly linear; pinnules alternate, varying from short triangular and roundish oval to elongate oval, approximate, joined by their decurrent bases, their margins crenulate; the proximal pair with their bases decurrent on the main rachis, which is alate; the medial nerve rather thick and strongly pronounced; the nervules obsolete; stem and also rachis of the pinnules strongly striate.

I have seen but a single small specimen from the coal-fields of Western Virginia; it appears as though the plant was tripinnate, and what I have called the stem was the rachis of a primary pinna. The plant has some affinities with *S. microloba*, Gutb., but is evidently distinct from it.

Museum of the Academy, Dr. Dixon.

GEN. CYCLOPTERIS.

C. FIMBRIATA, *Lesq.*

C. Wilsonii, Wood. Proc. A. N. S., vol. xii, 1860, p. 519.

GEN. ODONTOPTERIS.

O. ROTUNDIFOLIA, *N. Sp.* Pinnæ small, somewhat lanceolate; pinnules small, rather distant, irregularly orbicular, or roundish oval; nervation very indistinct; terminal pinnule irregularly oval, somewhat wedge-shape at the base, lobed on one side near the middle.

Cabinet of the Academy, D. R. Bennett.

O. LESCURI, *N. Sp.* Frond bipinnate?; pinnules alternate, varying from broadly ovate to elongate-ovate, suddenly and very greatly contracted at their base, mostly very obtuse; nervules dichotomously forking, pronounced, rather distant, a number arising from the base, but the central frequently heavier than the rest, and giving off more numerous secondary nervules, so as to present somewhat of the appearance of a midrib; rachis smooth.

The form of the pinnules varies very greatly in this as in all our species of the genus; the upper very small ones are somewhat spatulate, whilst some of the lower are

* Prof. Lesquereux informs me that it is the same species as the plant found by him in the Gates vein, Pottsville, and mentioned by him in his Catalogue under the name of *A. minuta*, Br.

so broad that were it not for their truncate base they would be almost orbicular. All that I have seen are very obtuse, except one broad, short leaflet, which is somewhat acuminate, and occurs on the same stem and close to an elongated, somewhat scythe-shaped, very obtuse pinnule. Some of the larger pinnules were apparently trilobate. The nervation also varies somewhat; in all of them there exist the same, strongly pronounced, rather distant, nearly straight nervules, but in some pinnules the tendency to the formation of a median nerve is much more marked than in the others. The contraction of the base also varies; in some leaflets it is so sudden and angular that the base may be said to be truncate; in these the contraction is generally most marked on the one side, and the part left for attachment is broad; in others, the larger pinnules, this contraction is less abrupt, more regular, and the basal angles are rounded; in such pinnules the attached portion is narrow. I have dedicated this beautiful species to Prof. Lesquereux.

Coal-fields of Western Virginia, Dr. Dixon.

PLATE VIII.

Fig. 1. *ASTEROPHYLLITES STACHYOIDES*. *Wood*. 1 *a*. Same, magnified, showing nutlet.

“ 2. *ANNULARIA MINUTA*. *Br.*

“ 3. *SPHENOPHYLLUM LATIFOLIUM*. *Wood*.

“ 4. *LEPIDODENDRON DUBIUM*. *Wood*. 4 *a*. Magnified leaf scar.

“ 5. *SIGILLARIA SOLANA*. *Wood*.

“ 6. *LEPIDODENDRON SALEBROSUM*. *Wood*.

“ 7. *SIGILLARIA PERPLEXA*. *Wood*.

“ 8. 8 *a*. 8 *b*. 8 *c*. 8 *d*. *ODONTOPTERIS LESCURI*. *Wood*.

“ 9. *ODONTOPTERIS ROTUNDIFOLIA*. *Wood*.

“ 10. *SPHENOPTERIS PTEROTA*. *Wood*.

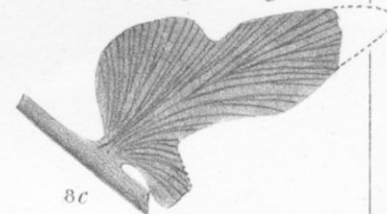
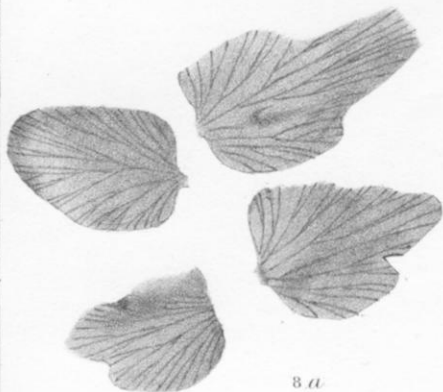
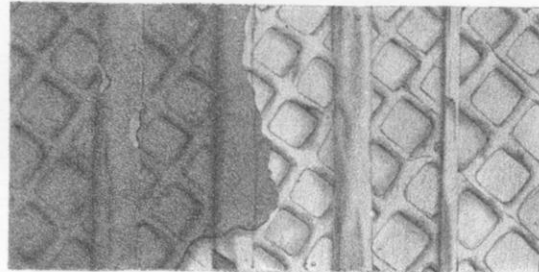
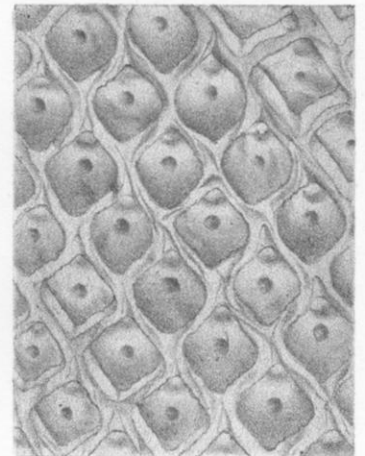
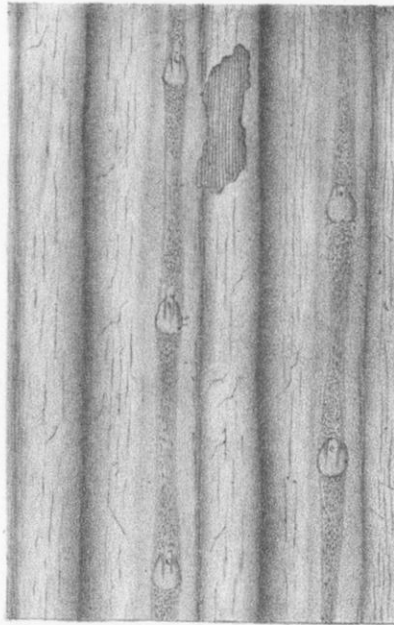
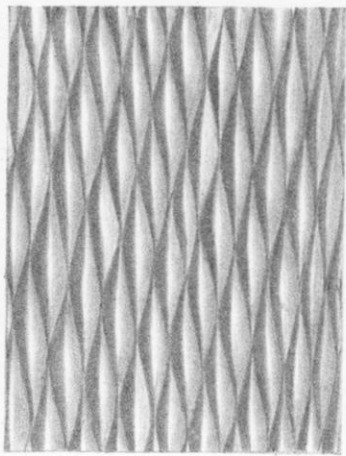
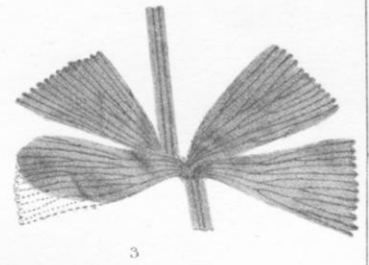
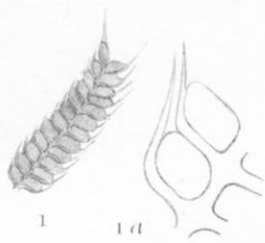


PLATE IX.

Fig. 1. LEPIDODENDRON VENUSTUM. *Wood.* 1 *a.* Magnified view of a portion of the surface of the same.

“ 2. LEPIDODENDRON ICTHYOLEPIS. *Wood.*

“ 3. SIGILLARIA CAMPTOTÆNIA. *Wood.*

“ 4. LEPIDODENDRON CHEILALÆUM. *Wood.* 4 *a.* Magnified leaf scar of same.

“ 5. LEPIDODENDRON URÆUM. *Wood.*

“ 6. LEPIDODENDRON DICROCHEILUM. *Wood.* 6 *a.* Magnified leaf scar of same.

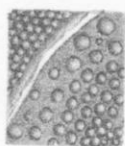
“ 7. SIGILLARIA CYMATOIDES. *Wood.* 7 *a.* Magnified view of leaf scar. (These figures have not sufficiently prominent the elevation of lower part of leaf scar.)

“ 8. LEPIDODENDRON DREPANASPIS. *Wood.*

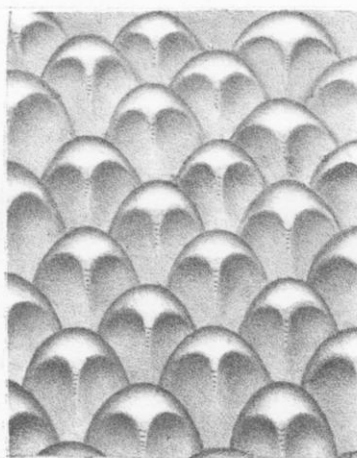
“ 9. SIGILLARIA BISTRIATA. *Wood.*



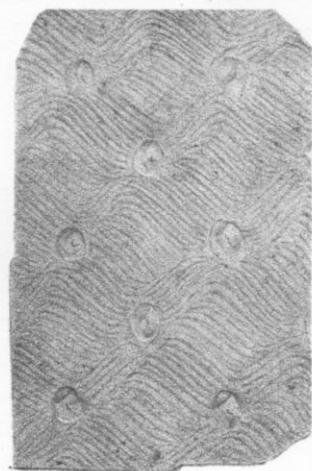
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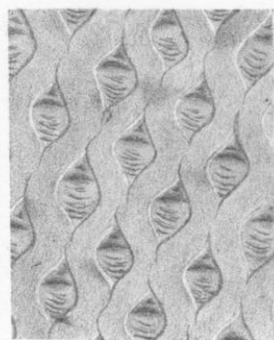
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3



4



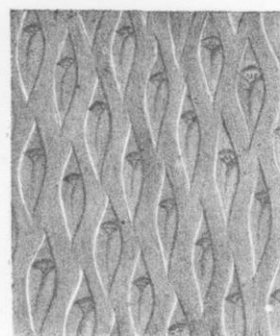
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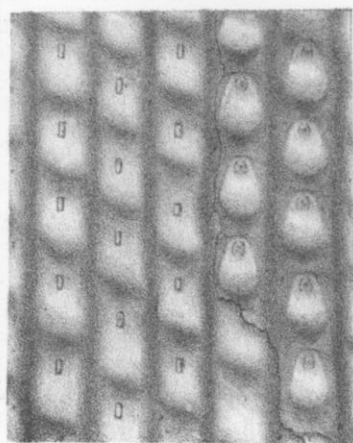
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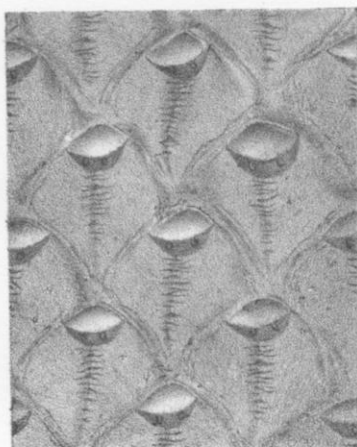


6



7a

7



8



9